Subject Index

Biological oxygen demand (BOD). *See also* Eutrophication
  and algal photosynthesis, 38–40
  reduction in, 81–82
BOD. *See* Biological oxygen demand

CCMP. *See* Comprehensive Conservation and Management Plan
Clean Water Act, 152, 159, 164
Coastal Zone Management Act, 152
Comprehensive Conservation and Management Plan (CCMP), 83–84
Corps of Engineers. *See* U.S. Army Corps of Engineers

Dissolved oxygen, tide gates and, 24, 42–43

East River
  classification of, 1–2
  geology of, 105–106
  hydrology of, 7–12
  RMS tidal transport through, 7, 9–12
  shipping channel depth in, 9
  subtidal flow in
    estuarine circulation, 11–12
    tidal residual flow, 10–12
  tidal excursion in, 9–10
  water quality in, 2
East River bridges, 93–94
  Bronx-Whitestone, 94
  East River-lower midtown location, 95
  East River-midtown location, 94–95
East River fish community
  compared with neighboring communities, 58–64
  estuarine divisions of, 64–65
  species composition of, 57–58
East River Tidal Barrage. *See also* Tide gates
  alternatives to
    New York City sewage treatment, 159–163
    other sewage treatment plants, 163–164
  analysis of impact
    findings of, 45–46
    limitations of, 46–47
    recommendations, 47
  background considerations, 171–176
  benefits expected, 122–124
  construction costs and schedule, 176
  Corps of Engineers and, 72–76, 77–79, 151–152
  description of, 1
  design issues related to, 115
    construction costs and schedule, 122
    gate and gate structure, 117–120
    location, 116–117
    navigation locks, 120–122
    significant problems, 124
  effectiveness expected, 177
  engineering solutions, 101
    proposed gate concepts, 109–112
    proposed layout, 108–109
  environmental community and environmental concerns, 157–158
    interference with natural hydrology, 155–157
    legal constraints, 158–159
  and estuarine environment
    Corps of Engineers comments on, 73–76
    hydrodynamics considerations, 77–79
    New York City perspective, 81–84
  Federal agencies review, 151–152
  general concepts for, 115–117
  hydrodynamic impacts of, 25–31
  implementation, 176–177
  justification for, 1
  legal constraints on, 158–159
  and marine navigation, 103–105
  and nitrogen removal, 3
  other barrages, 106
  permitting the, 151–153
  ramifications of, 3–4
  sedimentation associated with
    sediment transport characteristics, 51–53
    tidal gate impact on, 53–55
  site description, 101–103
  site selection, 106–108
    factors governing, 1
  and tidal rectification, 23
  uses for, 1
  and water quality
    in Long Island Sound, 32–38
    in New York-New Jersey harbor, 38–44
  water quality impacts of, 3, 23–25
EIS. *See* Environmental Impact Statement (EIS)

Electricity generation. *See* Tidal electricity generation
Environmental Impact Statement (EIS), 73–76
Environmental Protection Agency. *See* New York City Department of Environmental Protection; U.S. Environmental Protection Agency
Estuarine circulation, 11
  in New York Harbor, 12
Estuarine environment, tide gates and, 69–71, 73–79, 81–85, 87–90
Eutrophication
  analysis of, 33–34
  BOD and, 38–40

Fish community. *See* East River fish community

Harlem River, RMS tidal transport through, 10
Hudson estuary
  fish community in, 57–65
  improvements in, 81–82
  migratory fish species in, 66–67
  physical changes since 1845, 69–70
  salinity gradients in, 64
    East River Tidal Barrage and, 71
Hudson River Estuary Management Act of 1987, 57
Hydrodynamic impacts
  of East River Tidal Barrage, 25–31
  System-Wide Hydrodynamic Model, 25–31
    in tide gate operation analysis, 27–31
Hydrography
  of New York Harbor, 7–21
    East River and, 7–9
    Hudson River and, 7
    Long Island Sound and, 7
  subtidal flows, 10–12
  tidal excursion, 9–10
Hydrology, interference with
  East River Tidal Barrage concerns, 157–158
  and Everglades problems, 155–157
Hypoxia, 2
  in New York Harbor, 12–14
  nitrogen concentration and, 3
  in western Long Island Sound, 32–38
    factors contributing to, 12–14

Infrastructure
  developments in, 134–136
  multiple roles of, 130–134
  as public place, 129–130
Infrastructure-design professions, critique by, 136–144

Long Island Sound. *See also* Long Island Sound Study
  hypoxia in, 23
  nitrogenous nutrient concentration in, 18
  pollution in, 2
  RMS tidal transport in, 7
  salinity changes in, 20–21
  sewage effluent released into, 9
  tidal circulation in, 13
  water quality improvement expected, 16–19
Long Island Sound 2.0 Model, and dissolved oxygen measurements, 33–34, 37–40
Long Island Sound Quality Model, 32
Long Island Sound Study
  CCMP developed by, 83–84
  findings of, 2–3
  hypoxia findings of, 23
  major concerns identified by, 83
  water quality model LIS2.0, 25, 31–38

Narrows, the, 7–8
National Environmental Policy Act of 1969, 151
New York Bight, residual flow into, 12
New York Bight Restoration Plan, 25
New York City Department of Environmental Protection, 81–84
New York Harbor
  Hudson River tides and, 7
  hydrographic and tidal regimes, 7–12
  hypoxia in, 12–14
  residual flow into, 12
  salinity changes in, 20–21, 69
  tidal rectification effects on, 14–16
  water quality improvement expected, 19
New York Harbor 208 Water Quality Mode, 25, 38, 40–41, 46
New York-New Jersey Harbor Estuary Project, 69
Nitrogen
  cost of removal of, 3
  and hypoxia, 2–3
Nitrogen concentration
  calculated profiles of, 41–42
  factors controlling change in, 19
  tide gates and, 24, 35, 37–38

Ocean Dumping Ban Act of 1988, 3
Oxygen. *See* Biological oxygen demand; Dissolved oxygen

Rivers and Harbors Act of 1899, 151, 158–159
Root mean square (RMS) tidal transport
  at the Narrows, 7
  through East River, 7, 9–12
  through Long Island Sound, 7

Salinity
  changes in
    in Long Island Sound, 20–21
    in New York Harbor, 20–21, 69
  tide gate operations and, 24
Salinity gradients
  in Long Island Sound, 20–21
  in New York Harbor, 20–21, 69
Sediment transport
  and deposition, 52–53
  in East River, 51–53
  rate of, 51
  tidal gates and, 53–55
Sewage treatment
  in New York City, 159–163
  outside New York City, 163–164
Subtidal flows
  estuarine circulation, 11
  tidal residual flow, 10–11
System-Wide Hydrodynamic Model, 25–27, 38, 46

Tidal electricity generation, prospects of, 147–149
Tidal excursion, 9–10
Tidal range, at the Battery, 7
Tidal rectification
  basic concepts of, 14–16
  and East River residual flow, 14
  model simulation of, 27–28
Tidal residual flow, 10–11
Tidal transport
  at the Narrows, 7
  through Long Island Sound, 7
Tide gates. *See also* East River Tidal Barrage
  and coliform profile, 42–43
  and dissolved oxygen levels, 24, 42–44
  effects of
    on East River fish community, 57–65
    on estuarine environment, 69–71, 73–79, 81–85, 87–90
    on fish migration, 65–67
    on sedimentation transport, 51–55
  energy harnessing by, 12, 16
  impact of
    analysis of, 24–47
    hydrodynamic effects, 24–31
    on Long Island Sound water quality, 32–38
    on New York-New Jersey Harbor water quality, 38–44
  and nitrogen concentration, 24, 35, 37–38
  and nitrogen removal, 3
  and water quality, 3, 7–21

U.S. Army Corps of Engineers, and East River Tidal Barrage
  and EIS, 73–76
  hydrodynamic concerns, 77–79
  regulatory perspectives, 151–152
U.S. Environmental Protection Agency (EPA), 152

Water elevations
  model calculations of, 32–33
  tide gates and, 27–31
Water pollution control plants (WPCPs), 13
  location of, 26
Water quality
  classification of, 1–2
  of East River, 2
  East River Tidal Barrage impact on, 23–25
    in Long Island Sound, 32–38
    in New York-New Jersey harbor, 38–44
  factors influencing, 12–14
  improvements expected in
    in Long Island Sound, 16–19
    in New York Harbor, 19
  in New York City waters, 1
  rate of improvement in, 19–20
  spatial profiles of, 35, 37–39
  tide gates and, 3, 7–21
  wastewater treatment and, 1
  in western Long Island Sound, 12–14
Water velocity
  model calculations of, 34–35
  tide gates and, 27–28, 30
WPCPs. *See* Water pollution control plants

Index of Contributors[a]

Abrahams, M. J., 101–114

Birman, G., 147–149
Black, V., *153*
Bocamazo, L. M., 77–79
Bokuniewicz, H., 51–56, *88*
Bowman, M. J., 7–22, *87, 113, 114, 167*
Burley, D., *88*

Ekezian, H., 115–125

Fahn, C., *145*

Gastrich, M., *90*
Glowka, A., *165*

Haggerty, J. W., 151–153
Hill, D., ix–x, 1–4, *114*
Hixenbaugh, L. H., 115–125

Kane, J., 22

Lieber, G., *88–89*

Marchaj, T., *89*
Matlin, A., 101–114

Riccio, L. J., 93–97
Rich, C., *56*

Searchinger, T. D., 155–167
Squires, D. F., 171–178
St. John, J. P., 23–49, *87–88, 89–90*
Swanson, R. L., 22, *87, 88, 90*
Szeligowski, J. J., 115–125

Thatcher, M. L., 69–71, *166, 167*

Wagner, E. O., 81–85, *89*
Webster, A. C., 129–146
Will, R., 73–76
Woodhead, P. M. J., 57–68, *88*
Wouk, V., xi–xii

[a]Numbers in italics indicate comments made in discussion.